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Contribution of Non-Timber Forest Products (NTFPs) to Socioeconomic Wellbeing in Rural Cameroon

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ABSTRACT

The study aims to investigate the contribution of non-timber forest products to socioeconomic wellbeing in rural Cameroon. Data was collected mainly from households through the use of semi-structured questionnaires. Purposive sampling was used to select 178 households through random sampling. The results of the study show that the main NTFPs exploited are fruits, bush meat, honey and some of its products, fuel wood, *Prunus africana* and alpine bamboo. A majority of households identified exploit fuel wood, honey and bush meat. The NTFPs collected by the households are mainly used for cultural purposes, food, medicine, construction, and tools. Most NTFPs collected are used as tools and both food and medicine. Most households indicated that honey and fuel wood have the highest value in demand. The OLS estimate shows that household involvement in collection of NTFPs is significantly influencing household wellbeing, while infrastructure, natural, human and economic are the constraints in the exploitation of NTFPs. In terms of policy, government should create training centers and markets for the sales of NTFPs, this is a step towards amelioration of wellbeing.

1. Introduction

In most developing countries, forests play an important role in the livelihoods of local people. They depend on forests resources for various products such as fuel wood, construction materials, medicine, and food. Through the consumption of forest goods and services, these local people accrue socioeconomic benefits. There is a growing number of persons whose food, energy and shelter needs are met by their use of forest products. Moreover, forest environmental services and other services such as income and employment generation are being benefited by a large but unknown number of people. The latter group has a relatively small number but reaches tens-if not hundreds of millions if informal activities are included.(FAO, 2014).Non Timber Forest Products (NTFPs) within Central Africa are exploited for subsistence needs and also for sale, often with no or very little coordination by competent authorities and thereafter are transformed and marketed, locally, nationally, and internationally (Ingram and Schure, 2010). Cameroon is one of the countries in Central Africa that is richly endowed with natural resources and especially NTFPs. The dependence of fringe rural communities to the forest over the world depends on the forest resources for livelihood and this is due to the fact that forest eco systems are abodes of resources on which social life and economic development is anchored. Oku is such a community in Bui Division, Cameroon, on the edge of the Kilum-Ijim protected forest (Fogwe and Kwei, 2015).

Cameroon is rich in its floral biodiversity, making it second in Central Africa and fourth in Africa (Fogwe and Kwei, 2015). In order to maintain sustainability of ecological stability and prevent specie decline, the Ministry of Environment and Nature Protection in Cameroon since 2008 has created six categories of protected areas (national parks, zoological gardens, wild life sanctuaries, fauna and florae reserves and safari hunting zone) that today cover 13.38% of national space. Kilum-Ijim Mountain Forest Reserve in Bui Division, North West Region, is one of these protected areas in Cameroon created in 1987 in collaboration with Birdlife International. It is a bio diversity hotspot with varied species of flora and fauna and plays a major socio-economic role to the inhabitants of the Oku forest periphery.

The general desire in the management of forests which is the same with the Kilum-Ijim Mountain Forest is to obtain the '3Es' i.e. empowerment, economics, environment (Roe *et al.*, 2009). Through sensitization of stakeholders on the virtues of forests, socio-cultural institutions, community monitoring system as well as socio-economic implication of communities in forest conservation exploitation were set up to protect the forest. Despite the social, economic and environmental fall outs of the forest, Enchaw (2009) notes that livestock grazing in the Nchii, Mbai and Emfvee-Mill community forest of the Kilum- Ijim Mountain Forest Reserve has played a major role in preventing forest resources regeneration especially in the dry season.

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In dealing with the NTFPs, the Food and Agriculture Organization of the United Nations (FAO) prefers to use the term 'non-wood forest products', which excludes all woody raw materials. This means that items such as "timber, chips, charcoal and fuel-wood, as well as small woods such as tools, household equipment and carvings, are excluded" (FAO, 1999). This differs with those who prefer to use the term 'non-timber forest products', which usually includes fuel-wood and smaller woods. Furthermore, this definition excludes services, such as ecotourism and includes products that come from both natural forests and man-made plantations (Belcher, 2003). However others do not include plantations when considering sources of NTFPs.

In one of its publications on the subject the FAO classifies NTFPs under the use of plants for food, beverages, forage, fuel and medicine, animals, birds, reptiles and fishes for food, fur and feathers, and their products such as honey, silk, etc... and the services of land for conservation and recreation(FAO, 1991).Here, NWFPs are classified into products (animal and plant products), and services. The FAO will however prefer an explanation of the term which includes the sustainability of the supply of these products and therefore, defines NWFPs as; all goods and services for commercial, industrial and subsistence use derived from forests and their biomass which can be sustainably extracted, i.e. extracted from a forest ecosystem in quantities and ways that do not alter its basic reproductive functions (FAO, 1991).

The international trade significance of many NTFPs such as honey, gum arabic, rattan, bamboo, cork, nuts, mushrooms, resins, essential oils, and plant and animal parts for pharmaceutical products cannot be underrated. NTFPs can also include products used as food and food additives (mushrooms, fruits, herbs, spices and condiments, aromatic plants, game), fibers (used in construction, furniture, clothing or utensils), resins, gums, and plant and animal products used for medicinal, cosmetic or cultural purposes (FAO, 2008). So besides subsistence purposes, NTFPs are also becoming important internationally traded goods and this could lead to better welfare of rural inhabitants.

NTFPs studies are generally in a conflicting context between two ideas; forest conservation which has to do with a sustainable use of resources and economic development which has to with the benefit local people as well as governments from the forest. Due to this conflicting context, three global thoughts or paradigms have arisen, the classical development, classical ecology and new ecology visions. According to the classical development paradigm, economic development is only achieved by the exploitation of timber and agriculture. To them, conserving the forest means renouncing income and thus economic development. Classical ecology on the other hand sees that forest conservation should necessarily go in line with economic development. They think the forest harbors great resources (timber and non-timber) and also has a great environmental function whose value goes beyond the short term benefits that result from deforestation activities. These two views are criticized by the new ecology scholars that see a complementary relationship between the classical ecology and economic ecology in the long run. According to them, in the short run, conflicts may arise between these two ideas that will affect conservation, in the absence of appropriate follow up measures. It is in this conflicting environment between economic development and conservation that this study is carried out and that households exploit NTFPs in Oku sub division.

A series of literature can be found on NTFPs and their effects on development in sub Saharan Africa. This does not however cancel the relevance and importance of our work which will be situated in a locality which is rich in biodiversity and the results thereof will throw more light to a more specific case and give ample details for policy makers.

The importance of NTFPs in the wellbeing of rural inhabitants has long been recognized by authors and institutions. As from the late 1970s to the early 1980s, combining with the 'sustainable development' movement, there was increased recognition of the actual and potential value of forests to provide many different products and services, to many different people (Belcher, 2003). With recognition that the collective trade value of forest products other than timber was large, and possibly larger than the total trade in tropical timber, there was a renewal of academic interest in 'minor forest products'. Moreover, NTFPs research have focused on evaluating the social, economic and environmental contexts that shape patterns of use and trade and providing a socially differentiated assessment of the significant of forest resources in rural livelihoods (Ros Tonen and Wiersum, 2005). Given that NTFPs are attracting more and more attention from researchers worldwide, many studies stress on the importance of these products and their sustainable management. The contribution NTFPs to the subsistence of local populations and to the macro-economic development however differs very much from region to region (Kleinn *et al*., 1996).

However, detailed and contextual data seemingly still needs to be thrown on the actual contribution of NTFPs to the socio economic wellbeing of rural inhabitants in Oku Subdivision. Also, clearer understanding of dependence on NTFPs and their relative contributions to household incomes and rural livelihoods in Africa is complicated by a current dearth of quantitative data (Timko *et al.,* 2010; FAO, 1999). Moreover, in the NTFP sector, policies are largely from the top, and are often revenue-driven and not livelihood-driven, to the detriment of poor rural communities. National institutions do not carry out regular monitoring of the resources or

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evaluation of the socioeconomic contribution of NTFPs as they do for timber and agricultural products (Ahmed El Abass, 2006). Consequently to date, non-wood forest products still have to receive the attention they deserve and considerations should be made for their inclusion in the economic accounts of most countries.

While many strategies have sought to address access to resources and tenure, well-meaning governments have often developed supposedly supportive policies and institutional arrangements that have actually resulted in the unintended consequence of existing rights and/or benefits being eroded or taken away. Much of this happens when the economic value of the particular NTFP starts becoming significant. Also, rural communities still largely remain gatherers and suppliers of raw material, and play little role in value addition, and cooperatives have served to enhance such a role. Knowledge mining of traditional communities continues, with economic benefits from such knowledge being taken advantage of by established and financially endowed private processors (INBAR, 2003). Local people seek new products, uses and services from their wild lands in order to improve their economic status and wellbeing, that is, to alleviate hunger, malnutrition, food insecurity, poverty and disease, prevent further degradation of their limited land base, and to maintain or increase forest (vegetation) cover (FAO, 1996).

Due to this, available information sometimes may not be enough and thus insufficient to draw salient conclusions for policy implementations in rural areas. This work will try to look at NTFPs in the light of wellbeing of rural communities and especially households in Oku sub division and give its modest contribution to science and policy given the recent international exposure of some of its products such honey. From the above context and problem and in a bid to bring to light real and concise data on the contribution of NTFPs to the socio-economic wellbeing of rural inhabitants, case of Oku sub division, some research questions arise and to answer them, the study has as main objective to investigate the contribution of NTFPs on the socio-economic wellbeing of rural households; specifically: to determine the socioeconomic characteristics of the households involved in the collection of NTFPs; to identify the main NTFPs exploited by households at the Kilum-Ijim forest and their uses; to examine the relationship between NTFPs collection and household wellbeing; to explore the problems faced by Oku people in exploiting NTFPs; to suggest possible policy to ameliorate the NTFPs-household wellbeing nexus.

2. NTFPs and Livelihoods

The contribution of forests resources to rural livelihoods has global significance. An estimated amount of 1.6 billion rural people depend on forests to some extent, 1 billion out of 1.2 billion extreme poor depend on forest resources for all or part of their livelihoods and 300 – 350 million people look to the forest and live within or adjacent to dense forests on which they depend for their subsistence and income (CAO, 2012). Income from NTFPs plays an important role in the livelihood of local communities. NTFP collection either for subsistence or as an income generating activity is an important means by which poverty conditions for rural households can be improved.

The dependence on forest resources and contribution of forest resource to household vary across regions. Angelson *et al*., (2014) in their global comparative analysis on environmental income and rural livelihood found that environmental income accounts for 28% of total household income of which 77% comes from natural forests. Melaku et al. (2014) reported in their study in Southwestern Ethiopia that the contribution of NTFPs to annual household income is 47%. In this, 50% of the income was from agriculture and the remaining 3% was from off-farm in. Dependency of local community on NTFPs was measured in Central Himalayan foot hills by Rijal *et al*. (2010). This study estimated that NTFPs provided poorer households with a cash income share of 44-78%. Jagger (2012) in western Uganda estimated that households in rural Uganda derive 26% of total household income from forests and other wild areas including fallows, agricultural lands, wetlands, grasslands, and shrub land. Saha and Sundriyal (2011) revealed that high dependence on wide variety of NTFPs in humid tropics of northeast India and NTFPs contributed to 19-32% of total household income for different tribal communities in northeast India. A case study from northern Benin, West Africa, by Heubach (2011) found that income from NTFPs accounted to 39% of total household income which is second largest after crop production of 44%. Distribution of forest income among rural households was measured by Aung *et al*. (2015) in Natma Taung national park, Chin State of Myanmar revealed that the forest income is the first most important source of household income, contributing to about 50 % to 55% of the total household income in two study villages.

With regard to tropical forests, NTFPs are a "main source of livelihood of forest-dwelling communities, who rely on these products for their food, medicines and as raw materials for the houses, tools and equipment" (Ros-Tonen, 2000). Some practical advantages of NTFP extraction are that many are available as common property resources, they can be used with little processing and often they require low-cost, traditional technologies (Sunderlin*et al.*, 2005). The idea then is to open up NTFP extraction to markets and trade, whereby increased income and employment opportunities can lead to improved livelihoods and help bring people out of poverty. Belcher and Schreckenberg (2007) base this expectation on the "well-documented importance of many NTFPs in

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rural livelihoods, the emergence of new markets for natural products and the development of new marketing mechanisms, such as green marketing and fair trade." In principle, the commercialization of NTFPs seems like an important step in combating poverty alleviation as well as preserving forests.

Based on a meta-analysis of 61 cases of commercial NTFP production, Belcher *et al*. (2005) analyzed the role of commercial NTFP production in the household economy and developed the following typology:

Group	***Role of commercial NTFP production***
Subsistence group	NTFPs contribute little to the total household income (cash and subsistence), but is the main or the only source of cash income. Households in this group are typically found in remote areas, with limited infrastructure and low population densities. The products (mostly low-value products like palm fibres, fuel wood and medicinal plants) are often extracted from de facto open-access lands.
Supplementary group	NTFPs contribute less than 50% to the total household income, and the households are well integrated into the cash economy The NTFPs (e.g. fruits for local processing or consumption and medicinal plants for the regional market) are collected from the wild and supplements the household's income, often in times when other sources of income are low.
Integrated group	Similar to the supplementary group, NTFPs contribute less than 50% to the household's cash income and households are well integrated into the cash economy. In the integrated group, however, the product is cultivated and integrated into a diverse set of income earning activities. Production takes place predominantly on private lands and markets are mostly local. Examples of products traded by this group are bamboo, high-value wood carving, fruits and resin.
Specialized extraction group	The NTFP contributes more than 50% to the household's income and the households are well integrated into the cash economy. The product is harvested from the wild, is often of high value and traded regionally or internationally. Examples are certain food items and medicinal plants.
Specialized cultivation group	The NTFP species (e.g. specialty food products or resins) is cultivated in intensively managed systems and contributes more than 50% to the household's income. Integration into the cash economy is high. Cultivation is mostly on private lands and markets tend to be well developed – often international. Products cultivated by this group include those with relatively high yields per hectare, e.g. managed single-species plantations using high yielding varieties, fertilizers and irrigation.

Source: Formulated by author from Belcher et al. (2005)

Forest resources particularly NTFPs constitute the main source of income for the households in the low and middle income groups. Farm income and non-farm income are negatively correlated with NTFPs income. This means that local communities will be less dependent on NTFPs if they have access to better non-farm activities and agricultural land. Moreover, agricultural land is significantly and negatively correlated with the NTFPs income (Moe and Junchang, 2016).

Ambrose-Oji (2003) presents that for poorest groups, NTFPs do not present a significant component of their livelihood strategies accounting for no more than 6% of their annual total income. Poor groups are harvesting and utilising small quantities of lower value NTFPs. It is the middle income groups that derive the greatest benefit from NTFP collection, use and sale, harvesting a greater volume or more valuable products. Interestingly this pattern of use reflects that found by Godoy *et al.*,(1995) working with the Sumu Indians in Nicaragua, and some of the reasons Godoy and his colleagues put forward for these results appear to apply in Cameroon too. In Africa, fairly substantial differences in the ways in which men and women depend on and control NTFPs have been observed. For example, women collecting NTFPs in the Banyang-mbo wildlife sanctuary in Cameroon receive less income, but incur higher costs, than men. This sort of male dominance in earnings is not an uncommon occurrence in Africa (Timko*et al*., 2010).

3. Literature Review

The importance of many NTFPs to rural livelihoods cannot be overstated, as a wide variety of forest products are used as natural subsidies by rural households across Africa. These can entail products that are collected directly for subsistence, or those that are 'transformed' through processing (e.g., wood carving for sale) to earn an income. Some of those NTFPs listed below (e.g., fuel wood) are used for both subsistence and for sale in order to earn an income: medicinal plant collecting (Arnold, 1994, Belcher *et al*. 2003);animal food sources, including insects, molluscs, fish, crustaceans, amphibians, and bushmeat (Shackleton and Shackleton, 2004; Van Dijk and Wiersum, 1999);plant food sources, including mushrooms, seeds, edible fruits, vegetables, and root crops (Arnold, 1994; Shackleton and Shackleton, 2004);gums and resins (Arnold, 1994; Tadesse *et al*., 2007);grass or twigs for making hand brushes (Shackleton and Shackleton, 2004);wood for woodcarving and fuel wood (Belcher *et al*., 2003; Horning, 2003; Horning, 2004);charcoal (Horning, 2003; Horning, 2004); honey (Arnold, 1994; Monela *et al*., 2000); and canes, lianas, raffias, and twines for framing houses, and grass, bamboo, reeds, and leaves for roofing (Arnold, 1995) and chew sticks (Arnold, 1994; Horning, 2003).

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Forests products in several ways affects individual households' food security in several ways and in diverse ways make an important direct contribution to family diets. These food resources are established parts of the diet for huge numbers of people throughout the third worldand supplement the overall diversity and quality of diet, through the provision of a tasty and nutritious supplement to otherwise bland staple foods (Ahmed El Abass, 2006). Fogwe and Kwei (2015) speak of the Kilum-Ijim forest as a source of rural alternative food supplements for inhabitants of the neighbouring villages. The onset of the rainy season comes with the abundance of some alternative food species in the Kilum- Ijim forest such as the climber *Rubus pinates* (*Bakoh)*, shrub *Cunera longitilia* (*Kelylum),* herb *P.eoculenthus* (*Ndonkenkeir),*fungi or mushroom called *kelem* growing ideally on dead stems of wood species such as *Prunus africana*and *syzeum standi*. The mushroom harvesters are many because in addition to the villagers, students on holidays join the hunt from late March to late April. This is delicacy with outstanding medicinal and immune system virtues sold or consumed fresh and dry in Oku. Another supplement is the wild vegetable fruit called *Risbus piñatas* called *bakoh*in Oku that ripens at this time in the forest. There is also the harvesting of an endemic vegetable in the forest known as *W. Hockeberies* called *kefom*in Oku. Conserving these genetic resources for future generations is being increasingly recognized as both a moral and practical imperative, although the problem is in devising ways of achieving this (FAO, 1991).

Another aspect which is quite spread; often in urban as well as rural households is the use of forest, woodland and tree products for medicinal and other health ends. More than 80 percent of the world's people depend on traditional medicinal plants for their health care. Furthermore, about 20 percent of the drugs in modern allopathic medicine are derived from plant sources (FAO, 1995). Most plants used in traditional medicinal systems are still collected from wild sources. The dual use of NTFPs for medicine and food help give a varied taste in meals and have a preventive or curative role in diseases. A high relationship also exists between NTFPs' medicinal use and cultural values; for example, where illnesses are thought to be due to the spirits, plants have acquired symbolic importance as treatments (Arnold, 1995). However it is worth noting from contemporary studies that there is a high level of continuing use of traditional medicines in most cases.

For most of the worlds' rural households, NWFPs provide essential food and nutrition, medicine, fodder, fuel, thatch and construction materials, mulch and nonfarm income. These products are particularly important in relieving the 'hunger periods' in the agricultural cycle, and in smoothing out other seasonal fluctuations. Dealing in NTFPs can provide employment during slack periods of the agricultural cycle, and provide a buffer against risk and household emergencies (FAO, 1995). In most rural areas of developing countries, wood energy is often the only energy source and is of great importance to poor people. Statistics records that it contributes for 27 percent of total primary energy supply in Africa, 13 percent in Latin America and the Caribbean and 5 percent in Asia and Oceania. However, in a bid to reduce dependence on fossil fuels, the use of wood energy is on the rise in developed countries. For example, about 90 million people in Europe and North America now use fuel wood energy as their main source of domestic heating (FAO, 2014).

4. Theoretical Framework and Methodology

4.1. Theoretical Framework

Household production theory has been used to model the economic activities of rural households in a wide variety of cultural contexts, especially where households' time endowments are their primary factor input, and households consume most of their own production outputs. Hyde and Amacher (2000) argued for wider application to forestry issues and report such applications to fuel-wood. The basic theory posits a household that combines the time endowments of its members with other variable and fixed inputs (including available forest resources) to produce a utility-maximizing bundle of goods, subject to technology, budget, and time constraints.

The basic theory assumes a household that maximize its utility, typically a unitary measure of utility, subject to a set of production, budget, and time constraints. The major implication derived from this model is that household-specific implicit prices are needed whenever key markets are either missing or incomplete. Moreover, the optimal decisions are such that households allocate their labour between various activities (such as agriculture, NTFP collection, and off-farm activities) by equating the marginal utility of leisure to the value of the marginal product of labour in each activity. This is the case in Oku sub division where most households are mainly engaged in agricultural activities and depend on it for subsistence. Households allocate their time such that the shadow value of NTFP collection time is equal to the marginal utility of NTFPs obtained by allocating more time to collecting, which is the familiar proposition that marginal cost equals marginal benefit, applied, in this case to NTFP collection. The optimal conditions yield a set of production, consumption and labour allocation equations, which are functions of prices and wages, household preferences and technologies, which can be empirically examined.

Much of the interest in NTFPs stems from the link between current behavior and future resource conditions. Considering a two-period model, in which households maximizes the sum of current and expected future utility.

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In the second period, forest production depends on household knowledge of the forest, which in turn depends on time spent in the forest (learning) during the first period (Pattanayak and Sills, 2001). In addition, the quality of forest stocks in period two are affected by the aggregate amount collected by all households during period one. This seems to translate the sustainable use of the forest by households so that future generation in Oku can also benefit from it.

4.2. Methodology of the Study

4.2.1. Presentation of Study Area

This study was undertaken in Oku sub division which falls between latitude 6°5´ to 6°15´ North and 10°20´ to 10°40´ East stretching on 232 km^2 of the 35 villages being 87,720 inhabitants as of the 2005 Population (Fogwe and Kwei, 2015). Oku subdivision is located in Bui Division of the North West Region of Cameroon. Oku has an Equato-Guinean climate, characterized by two distinct seasons; the rainy season and the dry season. The dry season begins in October and extends through March, during which time the average temperature is about 20^{o}C and the air is dry and very cold. The rainy season begins in April and ends in September. The area has maximum temperatures of 16.5 to 19°C and minimum temperatures of 9 to 10.5°C. Rainfall is in excess of 3050mm per year (CVUC/UCCC, 2014). Lake Oku is the main water body within the municipality. There are many smaller streams and springs in the municipality whose catchments have been harnessed to serve the community with drinking water. Rivers Mfve and Mie are some of the popular rivers that flow right into Nigeria. There are also numerous water falls in this area. The forest reserve also acts as a water shed anchored on the top of volcanic rocks where many streams from Oku take their rise. There are also a multitude of springs that have been harnessed by the adjacent villages to supply community drinking water.

Oku is characterized by steep slopes ending up in valleys and an undulating landscape. Found therein is mount Oku which is the second highest peak in West Africa. From the altitude of 1800m-2400m, the slopes are relatively gentle and range from 15 to 20 % (ICB, 1989). The soils in Oku are of volcanic origin and ultisol derived from basalt, trachytes and granites with varying degrees of weathering processes which are the common rocks through which most soils have been formed. There are also volcanic and ferralitic soils in most of the highlands like in Elak Oku (FAO, 2002; CVUC/UCCC, 2014). This area has fertile soils for agriculture. The population is attracted by these rich volcanic soil and the near temperate climate that favor cultivation of crops such as coffee, beans, maize, Irish potatoes and a wide variety of vegetables (onions, tomatoes, cabbages, carrots, etc.). The potatoes and beans are exported to other parts of the country as well as neigh boring countries. These crops are gradually replacing coffee as the main cash crop of the area because of the dramatic decline in coffee prices during the mid 1980s. Oku is characterized by subsistence farming. There is a shortage of arable land, and the people farm even the steep hillsides.

The vegetation of the Oku is mainly savanna and montane forest. The montane forest covers a land area of 17,325 hectare and about 300.000 people depend on it for livelihoods. This forest is also very rich in medicinal plants. The natural vegetation at the highest altitudes of Mount Kilum (2800-3011m) harbors *Podocarpus latifolius, Prunus africana, Rapaneame lanophloeos* forests on deep soils and mostly carpets of *Alchemilla fisher* sp. Cameroon ensis within the afro-subalpine prairies on thinner soils. A host of rare species grow in waterlogged areas, often a combination of two or more *Kniphofia reflexa, Succisa trichotocephala, Juncus* sp. *Eriocaulon* sp. Part of the forest has been cleared or burned and greatly tampered with at these high altitudes. In these areas, *Adenocarpus mannii, Hypericum revolutum* and, near the forest edge, *Gnidia glauca* are the main ligneous species which are the first stages in the succession back to montane forest. Where no trees abound, *Pennisetum clandestinum* dominates (FAO, 2002).

The natural vegetation is montane forest between 2200 and 2800 meters. This can be subdivided into fairly open forest above 2400-2500 meters, below 2 500 meters, *a*bove 2400 meters to about 2700 meters, where dense monospecific alpine bamboo *Arundinaria alpina* thickets occur. Its occurrence is often associated with mixed montane forest, forming a distinct vegetation type (Thomas, 1989). Worth of note is the fact that the *Podocarpus latifolius- Arundinaria alpine* are unique in all of Central Africa.

Moreover, some areas where this montane forest has often been damaged in the past by fire, support other vegetation types. Two forest types are the last stages in the succession back to mature forest: one is *Gnidia/ Maesa lanceolata* wood land and the other is woodland dominated by *Erica mannii* and *Gnidia glauca*. Another distinct vegetation type is found between 1600 and 2000 m on the north western side of the forest. It is at the base of a cliff, made of horizontal hexagonal pillars of basalt. The vegetation canopy is dominated by *Symphonia globulifera, Strombosia scheffleri, Piptadeniastrum africanum, Tabrnae montana* sp., *Zanthoxylum rubescens* and *Garcinia* sp. (FAO, 2002).

Large areas of degraded grassland between 1800 meters and 2800 meters which are dominated by *Sporobolu africanus, Pennisetum clandestinum* and, at the very lowest altitudes, *Hyparrhenia* spp exist. To prevent the

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scrub- woodland- montane forest succession, these areas are regularly burned by grazers. However, within these grasslands, some swampy watercourses support the same rare plant community that is found above 2800 meters (the *Kniphofia- Succisa- Juncus*association).

This community forest is home to many animal species especially bird, rodents and reptiles. Indiscriminate hunting over the last 200 years has probably played a major role in the loss of Kilum-Ijim mega fauna, including species such as Leopards (*Panthera pardus*), elephants, buffaloes and antelopes. Moreover, the culture and tradition of the forest-adjacent Oku, Nso and Kom peoples encourages hunting these large mammals. The largest mammal in the present-day forest is the Olive Baboon (*Papio anubis*). Remaining large mammal populations are severely depressed and close to regional extinction, yet the long-term effects of any extinction on ecosystem stability and forest regeneration are still uncertain. Six small mammal species, which are strictly endemic to this forest are; *Chrysochloris balsai*, a Golden Mole, *Grammomys nov.*sp., Woodland Mice, *Hylomyscus grandis*, African wood lice, *Lamottemys okuensis*, Mount Oku Mouse, *Lamottemys okuensis*, Zebra mice and *Lophuromys nov.*sp. (Brush-furred mouse) (FAO, 2002).

Despite all the loss in the large mammal populations, the forest remains an excellent example of the birdlife riches of the Cameroon montane forest biome. Fishpool (1997) reports that six bird species of the Kilum-Ijim forest are in the IBA category A1 (species of conservation concern), eight are in IBA category A2 (species of restricted range, *i.e.*, with world distributions of less than 50000 km2) and 43 birds for Cameroon, of which 31 species have been recorded in the Kilum-Ijim forests are noted for IBA category A3 (biome restricted assemblage). Two of the 31 species are endemic to the Bamenda Highlands: *Tauraco bannermani* (Bannerman's Turaco) and *Platysteira laticincta* (Banded Wattle-eye), for which the Kilum-Ijim forest is arguably the last stronghold (Collar *et al*., 1994; Forboseh and Ikfuingei, 2001).

Finally, Lake Oku qualifies for special mention for the IBA category A4 (congregations) for little Grebe (*Tachybaptis ruficollis*), as the 1 percent threshold for this species in Africa is 500 individuals (Fishpool, 1997). The lake receives several hundred individuals at a regular basis and especially during the dry season.
From the presentation of the area, we can already have a justification for why this area was selected for this research. This study was conducted in seven villages (Ngashie, Jikejem, Mboh, Lui, Manchock, Keyon and Ngvenkei II) from the thirty five villages of Oku. These villages were chosen because they adequately represent the study area and are also located at close range to the Kilum-Ijim community forest. This close location gives households there in easy access to exploit NTFPs for subsistence and commercial purposes.

4.2.2. Data Presentation

Given that nuclear base of the local community is the household, this last is the basic unit of analysis for this study. Quantitative and qualitative techniques were used to obtain data from primary and secondary sources. Primary data was obtained from a questionnaire which was administered to the surveyed population as a tool for face-to face interview. This technique which was chosen is time consuming and needs an interviewer who is capable of asking the questions in a clear and concise way, recording carefully the answers and maintaining a good rapport with the respondents, motivating and guiding them through the questionnaire. Moreover, the locally spoken dialect had to be mostly used to interview some of the respondents.

In spite of the above-mentioned constraints this tool seemed to be the most suitable one in order to avoid any problem with the sample frame and to enable the interviewer to be able to record and observe even the non-verbal gestures of the interviewee. A semi-structured questionnaire which included questions covering the following key areas; demographic questions about the respondents' age range, and sex, level of education, wealth status, marital status and household size was used for the household respondents and put at the beginning of the interview schedule. Questions were also asked to get information concerning the NTFPs prevailing in the study area, utilization systems of these products, constraints in the collection, etc. To get the secondary data, we proceeded through related works in articles, reports, journals, etc. Information was also gotten from documents from other sources such as NGOs. Out of the 35 villages that make up Oku, 178 questionnaires were administered to 7 of them. Multistage sampling techniques were used in sample selection. Purposive sampling was used to work in the 7 villages because they are located at a close range to the Kilum-Ijim forest and a random sampling was used in the selection of households.

4.2.3. Data Analysis

The collected data was then analyzed using statistical software and econometric analysis as is the case in some works by Langat et al. (2016), Moe and Junchang (2016). Statistical Package for Social Surveys (SPSS) and excel were used. Thus, we shall realize our objectives as follows: objective 1, 2 and 4 were attained through the use of excel and SPSS. Here, we used descriptive statistics (percentages, absolute, relative and cumulative frequency) and objective 3 was attained through the use of a linear regression, precisely by using ordinary least square in SPSS to estimate the value of NTFPs on rural livelihood.

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The generic model linking Non Timber Forest Products to the Well-being of the rural households is as follows: $WB_i = \alpha_1 X_i + \beta_1 NTFP_i + \mu_{1i}$

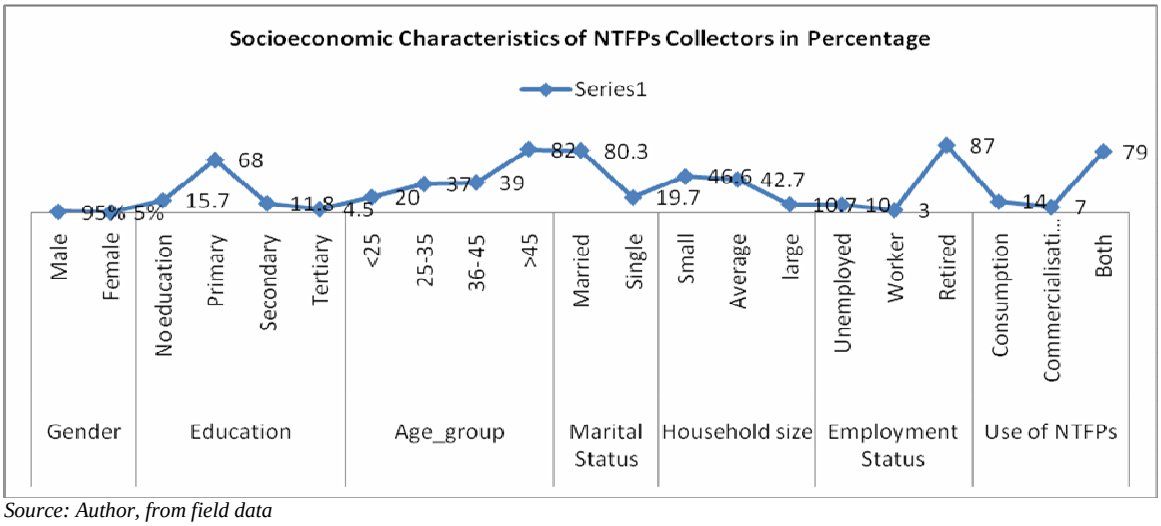
Where: WB_i = Well-Being of household $i's$ involve in exploiting Non Timber Forest Products, X_i = other independent variables influencing the household in their effort to exploit the Non Timber Forest Products (level of education, age, family size, gender, place of residence, involvement in working group, access to credit). $NTFP_i$ = Non Timber Forest Products: which in our study is considered to be the main independent variable, μ_i = is a random error term. β_1 = is the parameter of primary interest and represents the impact that NTFPs has on rural household livelihood in the Oku community and α_1 = is the parameter of other independent variables influencing the household in their effort to exploit the Non Timber Forest Products (level of education, age, family size, gender, place of residence, HH access to NTFPs, etc). The equation reports the linear regression (OLS) estimate that measures the impact of Non Timber Forest Products (NTFPs) on rural household livelihood in the Oku community.

5. Results and Discussion

In this section, we have presented the results and discussion of the study with respect to: socio-economic characteristics of households involved in the collection of NTFPs, identification of the main NTFPs exploited and their uses, relationship between NTFPs collection and household wellbeing, constraints and problems faced by the households in exploiting the NTFPs.

5.1 Socio-economic Characteristics of Household involved in the collection of NTFPs

As indicated in Figure 1, the male exploiters are about 95 percent while the female exploiters are 5 percent. This result seems to go in line with that obtained by Ingram *et al*.,(2010) in their study on the Cameroon bamboo production consumption system where 90% of collectors were male. It should be noted that most of the questionnaires were administered to household heads and most household heads in this area are men. This is a reality of the field given that the forest is located on the Kilum-Ijim Mountain and movement to the forest is a very tedious one. Moreover, most of the exploitation chores are tedious and demand a lot of energy such as collection of fuel wood and carrying to the market, honey collection activities, etc. Another reason that could explain these percentages is that most respondents are involved in farming activities, while the men collect NTFPs, the women and the children involved in farming activities. The level of education as seen in figure 1 shows that 15.7% of the respondents do not have any formal education, 68% have only primary education while 11.8% have secondary education and only 4.5% have higher institution education. This shows that larger percentages of NTFP dealers have little or no formal education while only few learned people are engaged in it. This could be explained by the fact that most persons who get to the secondary education eventually end up migrating to urban areas for higher education, the result correlates with those of Ingram et al., (2010).



Source: Author, from field data

Figure 1- Socio-economic characteristics of Household involved in the collection of NTFPs

The age of the NTFPs dealers is an important factor that affects their level of involvement, productivity and overall coping ability. The most represented age groups involved in the collection of NTFPs are: those >45 years, between 35-45 and 25-35 years old with 46.1%, 21.9% and 20.8% respectively. It can be deduced that the active age group is engaged in the business. This can be so probably because they are endowed with strength to

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carry out the tough activities of extraction. The results seem to correlate with that of Moe and Junchang (2016) who in their study found out that average age of the household heads involved in collection of NTFPs was 46.23 years with a minimum of 22 years.

In terms of marital status, 80.3% of NTFP dealers are married, while 19.7% are not. The high percentage shows that high numbers of people are feeding their family through the collection of NTFPs. It is worth noting that widows, widowers, the divorced were considered in this study as single. Households involved in the exploitation of NTFPs in Oku are mainly small and medium size households (46.6% and 42.7% respectively). Large households only account for 10.7%. Almost all respondents are unemployed, this can explain why a good number of them consider themselves as poor and cannot afford for some working tools. Moreover, the collection of NTFPs activity is a demanding one which according to most workers can't really blend with their job activities. Figure1 presents the state of employment status of respondents. The NTFPs collected in the households are mostly for both consumption and commercial purposes (79%). 14% of respondents collect NTFPs only for consumption purposes and 7% only for commercial purposes.

5.2. Identification of Main NTFPs and Uses

5.2.1. Identification of Main NTFPs

Most households are involved in the collection of fuel wood, honey and bush meat (38.2%, 32.0% and 14.6% respectively). This probably is because of their household use and economic value. Moreover, fuel wood is the main tool used in local bakeries and restaurants for baking and cooking. It represents the most immediate source of cash income for most households. For purposes of analysis, we noted only the main NTFPs collected per respondent but it is worth noting that some respondents exploit more than one NTFP at a time. For example, almost all households principally involved in the collection of honey also secondarily collect alpine bamboo to serve in the production of beehives and for local household chores such as building fences making ceiling, etc., others who get into the forest to collect fuel wood, honey, *Prunus Africana* will hunt forest rodents if they see any, fuel wood is the main energy source in the households so is secondarily collected in most of the households. Respondents indicated that due to scarcity of bush meat and control from the government the household hunting sector is falling (tab.1).

Table 1- Main NTFPs exploited by households in study area

NTFPs	***Absolute Frequency***	***Relative Frequency***	***Percentage***
Fruits: Strawberry, Bush Mango,…	3	0.017	1.7
Bush meat: Rat mole, Monkeys, Rabbits, Grass cutters,…	26	0.146	14.6
Honey: Wax made from sieved honey remains	57	0.320	32.0
Prunus Africana	7	0.039	3.9
Fuel wood	68	0.382	38.2
Others: Alpine Bamboo, Vegetable, Craftwork, Mushroom, locally made hoes and axes	17	0.096	9.6
Total	178	1	100

Source: Author, from field data

Harvest of these NTFPs is done with locally made tools and traditionally. Tools like axes and cutlasses are used to harvest fuel wood, alpine bamboo and for craftwork by the households. It is worth noting that most households indicated that they are permitted to harvest only dry fuel wood and alpine bamboo even though from field observation this was not always the case. Locally made traps are used to get bush meat and honey harvesters generally do not have the working material to protect themselves from sting. Collection activity by the households is mostly done very early in the morning. The households get going to the forest as from 3am and this made direct contact with them a little complicated to the researcher. Even though most households seemed to have knowledge of a sustainable use of these resources from NGOs such as SOPISDEW, and CAMGEW, the practice seems to be unsustainable based on field observation.

Table 2 presents an identification matrix and percentage of exploitation which summarizes the use of NTFPs in households. We can note from the table that most of the NTFPs collected by households are used for tools (39.9%), both food and medicine (31.5%) and food only (16.9%).

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Table 2- Identification matrix of NTFPs and percentage of exploitation

Use / NTFPs	***Culture***	***Food***	***Medicine***	***Const***	***Tools***	***Cul/F/T***	***F/M***	***T/Con***	***Total***	***%***
Fruits	Xx	3	xx	xx	xx	Xx	xx	xx	3	1.7
Bush meat	Xx	26	xx	xx	xx	Xx	xx	xx	26	14.6
Honey	Xx	Xx	Xx	xx	1	Xx	56	xx	57	32.0
Prunus Africana	Xx	Xx	7	xx	xx	Xx	xx	xx	7	3.9
Fuel wood	Xx	Xx	Xx	xx	68	Xx	xx	xx	68	38.2
Others	3	1	1	2	2	1	xx	7	17	9.6
Total	3	30	8	2	71	1	56	7	178	Xx
%	1.7	16.9	4.5	1.1	39.9	0.6	31.5	3.9	xx	100

Source: From field Data, N/B: Cul/F/T: Culture/Food/Tool; F/M: Food/Medicine and T/Con:Tool/Construction

5.2.2. Use of NTFPs in the Households

The NTFPs in the households were either used for food, cultural, medicinal, construction, or tool purposes. Some of them had multiple purposes. The NTFPs use will also be looked at in terms of their consumption and commercial purposes.

Table 3- Use of NTFPs in the Households

Use	***Purpose of Use***
Culture	Oku is known for its rich cultural diversity. Some NTFPs contribute largely to this diversity. Traditional spears made out of alpine bamboos which serve generally in cultural celebrations, funerals, etc. Craftwork from households often will serve as a tool to preserve the traditions of the people in enthronement ceremonies as traditional chairs, as a representation of ancestors, etc. Table 6a shows the percentages of NTFPs used by households for cultural purposes.
Food	Households in Oku mainly depend on farm products such as; Irish potatoes, beans, corn for food but an assortment of fruits, bush meat are used to add extra flavor to the starchy traditional staple dishes such as corn fufu. Some bush meat commonly called by consumers “Oku sardine” or “fehse” in the local language is the most consumed among other bush meat.
Alternative food source	Honey mainly can have a dual purpose of food and medicine. Out of the 57 respondents that collect honey, 56 indicated that the honey is used for food and medicinal purposes. Figure 14 presents Oku white honey.
Medicine	The Kilum - Ijim mountain forest reserve is a paradise of medicinal flora. Apart from *Prunus Africana* which is a major medicinal plant used to treat fever, other NTFPs as reported by the households are used for medicinal purposes. Honey is used as a medicinal product to cure ailments like cough, fever, stomach disorder, malaria fever and gastric. Sometimes it is mixed with garlic to produce the cough medicine. Liquid products for pain and rashes are also produced from honey. They also indicated that it can also be applied to fire burns for quick recovery.
Construction	Alpine bamboos are the main NTFPs used for this purpose. They are used in households as ceilings and construction works on wall as presented in figure 15. This reduces their expenses on conventional building material. Also, they are used to build fences for gardens, homes, etc.
Tools	NTFPs such as fuel wood, honey and bamboos are used as tools in households. Fuel wood is mainly used as a cooking tool in households, restaurants and bakeries. Households that have access to NTFPs have a sure source of energy and this is the main source of energy in the study area. Honey as a tool is mainly through its products. Many households reported that chaffs from drained honey can be used to produce wax which in turn will help in the production candles. Shoe polish can also proceed from this.
Drink	Households also reported that juice can also be made out of honey. It is worth noting that very few households are engaged in this form of transformation as this is left in the hands of the honey cooperative.

Source: Author, from the field discussion

In addition, to the above uses, most households use NTFPs principally for consumption, commercialization and or for both consumption and commercialization. NTFPs in Oku are not only used for consumption in households. Almost all respondents (78.7%) indicated that they use NTFPs for both consumption and commercial purposes. Also, 14.6% of the households collect only for consumption purposes and only 6.7% for commercial purposes only.

A major quantity of bush meat is commercialized by households in this area and supply to neigh boring localities such as Kumbo. They are packaged in leaves and sold between 1000-1500FCFA. Honey collected by households is sold to the honey cooperative and individuals. The price ranges between 25000-30000FCFA for a bucket of crude honey. The cooperative then sieves the honey to produce the pure white honey that they sell at higher prices (90000-100000FCFA for a bucket). The cooperative is also involved in transformation of the honey products. A kilogram of wax from the honey chaffs is sold at 3000FCFA. Fuel wood is sold by the households in local markets at about 700-1000FCFA for a bundle. Alpine bamboos are sold in bundles of 5 for 500-1000FCFA, (Table 4).

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It is important to note that proceeds from these sales help in other household needs such; school needs to children, purchase of seedlings for farms, etc. It is worth noting that based on household preferences, and market demand, some NTFPs according to respondents are more sought after than others and some have a higher value than others. According to field findings, 52% of respondents indicated that honey has the highest value, while 32% indicated that fuel wood had the highest value. With regards to most demanded NTFPs in the area, 49% said honey was most demanded while 34% said fuel wood was most sought out (see, Table 4). This is probably because of Oku white honey's new standing in the international market as well as its high local demand. Its medicinal value could also be a reason for its high value and demand. Fuel wood too has a high demand in households and commercial food vendor stores which justifies its percentage. The following figures give details of NTFPs with highest value and those with highest demand (Table 4).

Table 4- Identification patrix of NTFPs and percentage of exploitation

Purpose / ***NTFPs***	***Consumption***	***Commercial Use***	***Both***	***Total***	***Percentage***
Fruits	1	-	2	3	1.7
Bushmeat	2	1	23	26	14.6
Honey	4	2	51	57	32.0
Prunus Africana	2	2	3	7	3.9
Fuelwood	15	4	49	68	38.2
Others	2	3	12	17	9.6
Total	26	12	140	178	-
Percentage	14.6	6.7	78.7	-	100

Source: Author, from field data

The low percentage of fruits could be because it has low commercial value and most households do not specialize in their collection. Also, due to restriction and control from the government in order to promote sustainable use, households have reduced their collection of *Prunus africana* and bush meat. This does not however mean these products have low value because *Prunus africana* has an international recognition due to its medicinal and economic value given that between the year 1998 and 2000, averagely 592.02tons of *Prunus africana* were exported from Cameroon (Ingram and Schure, 2010). From field observation, it was noticed that some NGOs such as SOPISDEW are actively involved in the domestication of *Prunus africana*. This NGO in the month of august had a working session with IFAD on a plan to come up with a cooperative that will manage the commercialization of *Prunus africana* in order to benefit local households in Oku. This could be an indicator for a promising future for households involved in the collection of this NTFP (Table 4).

5.3. NTFPs and Wellbeing of Households

The OLS estimates result shows that, there is a very strong positive relationship between household involvement in collection of NTFPs and family wellbeing. This shows that if households increase their involvement in collection of NTFPs by one unit, their family welfare will increase by 97.6 percent. Household members' access to NTFPs was significant at 1%. Increasing the access of everyone in the household to NTFPs will as well increase family welfare. There is therefore a strong positive relationship between household members' access to NTFPs and family wellbeing. Level of education of exploiters was significant at 1% and has a strong negative relationship with family welfare (Table 5).

Table 5- Estimates of NTFPs and Household Welfare

Independent Variable	***Coefficient***	***Standard Deviation***	***t-statistics***
	Family Welfare		
Involvement of NTFPs Collection	0.976***	0.187	5.210
HH Members' Access to NTFPs	0.069***	0.023	3.020
Level of Education	-0.842***	0.271	-3.11
Household Size	0.862*	0.447	1.930
Age Group	0.501	0.812	0.657
Gender	0.162**	0.064	2.513
Reasons for Collection	0.164	0.102	1.613
Geographical Location of Households	0.205***	0.60	3.450
Type of Market	-8.362	0.000	-1.289
Constant Term (α)	-0.847**	0.370	-2.287
R^2	0.3591	n/a	n/a
F-Statistics	12.477[11:000]	n/a	n/a
Total	178		

*Source: Author, from field data: N/B: *, ** and *** Significant at 10%, 5% and1% level*

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This shows that the more we have persons with level of education being primary school and persons with no education involved in the collection of NTFPs, the less the family wellbeing will be. In other words, if the participant is a graduate of a primary school or is not educated at all, his/her wellbeing as a result of collection of NTFPs decreases by a factor of 0.842, as compared to other levels of education everything being equal. More education will be of benefited then to the exploiters. Household size was found to be significant at 10%.

More small and medium size households will benefit from the collection of NTFPs. Age group was found to be not significant. This shows that age group of exploiters of NTFPs does not affect wellbeing of their households. Gender was significant at 5% level. More male exploiters of NTFPs will increase family wellbeing of their respective households. Reason for collecting as in for consumption, commercial or both was not significant. Geographical location of households or their nearness to the forest was significant at 1%. This shows that the closer households are to the forest, the more they will benefit from NTFPs and this will increase their family wellbeing. The type of market where households trade the NTFPs they collect was not significant.

5.4. Constraints faced by households in exploiting NTFPs

Infrastructural, natural, human, legal, economic, and other constrains were identified to be the constraints that households face in exploiting NTFPs.

5.4.1. Infrastructure

More than half of the households indicated that the major constraint faced in the exploitation of NTFPs is infrastructure. Out of 178 respondents, 117 indicated this constraint. Households complain of the bad road network linking households to the mountain and to the markets too especially during the rainy season. This makes movement to the forest very difficult given the advance age of some exploiters. Most tools used in harvesting NTFPs are locally made and crude tools or often absent in some households. Honey harvesters are often faced with the risk of bee sting during transportation of beehives, collection of honey from them, etc because most harvesters do not have adequate working materials. Due to the bad road network, transporting fuel wood and bamboos from the forest to the households and market is a very tedious adventure. Some households as a result prefer to market the fuel wood at their door post while others will collect and leave in the forest for buyers to collect there (Table 6).

Table 6- Household Constraints in Collection of NTFPs

Variables	***Values***				
	Absolute Frequency	***Constraint***	***None Constraint***	***Constraint Ratio***	***Constraint Percentage***
Infrastructure: Roads, Working tools, materials, etc	178	117	61	1: 0.521	65.73
Natural: Climate, topography, rainfall, sunshine, temperature, etc.	178	85	93	1: 1.094	47.75
Human: Bushfires, conflicts, theft, health, age, etc	178	45	133	1: 2.956	25.28
Legal: Traditional and government restrictions, boundary limits, etc	178	22	156	1: 7.090	12.36
Economic: Price fluctuations, involvement in value chain, etc	178	44	134	1: 3.045	24.72
Others: Other activities, transportation difficulties, technical knowhow, distance, etc.).	178	12	166	1: 13.833	6.74

Source: From field Data (2016)

5.4.2. Nature

Natural constraints were second most pronounced constraints. Out of 178 respondents, 85 indicated that natural constraints were a major problem. Some NTFPs are located at high altitudes that make it sometimes complicated to access. Dense mono specific alpine bamboo *Arundinaria alpine (*now referred to as *Yushina alpina)* can be found above 2400 meters to about 2700 meters.(FAO, 2002). Moreover, thick bushes make accessibility to and transportation of some NTFPs such as fuel wood and bamboos difficult to the exploiters. This makes transportation of such NTFPs to households difficult. Some have gotten lost in the due to its thick nature. Respondents also complained of the constant cold on the mountain. Mount Oku falls within a micro-climatic zone described as cold, cloudy and misty with average annual maximum temperature of 16.7c to 18.9c and mean annual minimum of 8°Cto 10.6°C. According to Fogwe and Tchotsoua (2010) rainfall on the Oku –

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Kom highlands are torrential and fluctuate from 2200mm to 3000mm. This rainfall last for eight (8) month of the year and triggers enormous geomorphic changes on the landscape. This makes working difficult and exposes them to sickness.

It was also highlighted by the households that the climate at the mountain is not favorable for habitation of bees. They said bees prefer warm places like Mbam. Households involved in the collection of honey thus have to build their hives, carry them to Mbam and expect bees to enter into. Thereafter, the hives containing the bees are carried by the exploiters on their heads to the mountain where they feed on the two plants that yield white flowers in particular – *schefflera abyssinica* and *nuxia congesta*– which help give Oku white honey. Some exploiters have been stung by bees in the process.

5.4.3. Human

Out of every three respondents, one presented human constraints such as Bushfires, conflicts, theft, health, age. Bushfires are often caused by bee harvesters and farmers who have invaded the some parts of the Kilum-Ijim forest for cultivation land. These bushfires have caused the immigration of some forest animals and thus led to scarcity of bush meat. They also have contributed to the destruction of some the rich medicinal flora of the forest. Invasion of forest land for cultivation land due to the growing of population of the area but reduced land has also produced the same effect. Exploiters also complain of theft of their products. This was mainly a constraint given by households that hunt and collect honey. When they place their traps in the forest and get animals, sometimes they'll not find the animals when they get back to check. Others who keep hives in the forest will come back later to discover that the honey has been stolen. Conflicts often arise between NTFPs exploiters and other forest users such as grazers. This is often because cows sometimes obstruct the traps set by the hunters. With the advance age of most of the exploiters, there is reduction in the frequency of collection and thus reduction income NTFPs. This, some respondents said is because they are frequently sick at such ages.

5.4.4. Economic

The major economic constraint was given by households that collect honey. This is a constraint the limitation of their involvement in the value. Most households as was indicated by households and observed by the researcher are still just suppliers of primary products. This limits their benefits. Honey collectors supply the crude honey to the cooperative that does the transformation to the pure white honey and other products. From the chaffs of the crude honey, a honey beverage is produced; wax is produced from which we get candles. Households that collect bamboos limit at using them for household needs such construction and production of beehives. Little is known and done on other uses and forms of transformation of the alpine bamboos such as toothpicks, household furniture, etc. There is a low demand in some NTFPs such as alpine bamboo products and fruits. This affects the income of households that exploit them for commercial purposes and has caused most households to focus on exploitation of honey and fuel wood that have high demand.

5.4.5. Legal

A few respondents have legal constraints especially those who exploit *Prunus africana* and other medicinal plants, and bush meat. This was not the case before as households could freely collect *Prunus africana* without any restriction. With its overexploitation and high demand in the international market, the government through traditional authorities and local forestry representatives in Oku it's restricting the collection. Restriction on bush meat is as a result of its unsustainable use by households and the risk to extinction of some fauna specie.

Other constraints include the involvement of households in other activities, transportation difficulties, low technical know-how in collection methods, distance covered to get the NTFPs to the households and market.

6. Conclusion

This work which was geared at looking at the contribution of NTFPs to socio-economic wellbeing of rural households, case of Oku sub division had as of objectives to look at the socio-economic characteristics households involved in the collection of NTFPs, identify the major NTFPs exploited in the area and their uses, look at the relationship between NTFPs and wellbeing of households involved in the collection, examine the constraints that households face in the collection of NTFPs and suggest possible policy recommendations to ameliorate the NTFPs-household wellbeing relationship.

Majority of the respondents were male (95%) while only 5% were female. Most of the respondents had undergone only primary education (68%); a few others had no formal education (15.7%), secondary (11.8%) and higher education (4.5%). A greater number of those involved in the collection of NTFPs were above forty five years old (46%), between thirty five and forty five years (21.9%), and between twenty five and thirty five years (20.8%). Those involved in the collection activities that are less than twenty five were the least (11.2%). Basically, respondents were married (80.3%) while a few were single (19.7%). Most households were small

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(46.6%) and medium (42.7%) while large households seemed not to be very involved in the activity (10.7%). The sector was mainly invaded by poor households (75.3%) and with a few averagely rich households (20.8%). Majority of households indicated that all their members had access to NTFPs (76%). Almost all households surveyed live near the forest (95.5%) which explains the easy access to NTFPs. Those involved in the collection of NTFPs are in a majority unemployed (87%) and a few are workers (10%) and retired (3%). Households collecting NTFPs in a majority do so for both consumption and commercial purposes (79%).

Some NTFPs were identified as those exploited by the households. Fruits such bush mango and strawberry were identified. Bush meat such as rat mole, monkeys, rabbits, and grass cutters were also identified. Honey and some of its products such as wax, fuel wood and *Prunus africana*are also exploited by the households. Other NTFPs such as alpine bamboo, vegetable, locally made hoe and axe handles, mush room and craftwork were also identified. A majority of households identified exploit fuel wood (38.2%), honey (32.0%) and bush meat (14.6%). The NTFPs collected by the households are mainly used for cultural purposes, food, medicine, construction, and tools. Most NTFPs collected are used as tools (39.9%), both food and medicine (31.5%) and only food purposes (16.9%). Most households indicated that honey and fuel wood had the highest value (52%, 32%) and demand (49%, 34%) respectively.

A linear regression was run to examine the household wellbeing and NTFPs relationship. It was deduced thereof that household involvement in collection of NTFPS, household individual members' access to NTFPs, geographical location to the forest and level of education were all significant at 1%. There is a strong positive relationship between household involvement in collection of NTFPS, household individual members' access to NTFPs, geographical location of households and household wellbeing while a strong negative relationship between level of education and household wellbeing was deduced. Gender of respondents was significant at 5% and had a positive relationship with household wellbeing while household size was significant at 10% with a positive relationship to household wellbeing too. Various constraints were identified such as infrastructure, nature, human economic, legal and others. A majority of households face infrastructural (65.73%), natural (47.75%), human (25.28%) and economic (24.72%) constraints.

In terms of policy, multiply ventures on organizing seminars and workshop to equip households on how to transform the NTFPs, this is a good step of alleviating poverty

References

1. Ahmed El Abass, M., 2006. Contribution of Non -timber Forest Products (NTFPs) in Household Livelihood in the Rural Areas of Shiekan Province, North Kordofan State, Sudan. PhD Thesis, Department OF Forest Management - Faculty OF Forestry, University of Khartoum, Sudan.
2. Amacher A.F., 2000. The role of non-timber forest products in sustainable tropical forest management. HolzalsRoh- und Werkstoff 58.
3. Ambrose-Oji, B. (2003). The contribution of NTFPs to the livelihoods of the 'forest poor': evidence from the tropical forest zone of south-west Cameroon. *International Forestry Review*, 5(2):106-117. DOI: 10.1505/IFOR.5.2.106.17420.
4. Angelsen A. Angelsen A., Jagger P, Babigumira R., Belcher B., Hogarth N.J., Bauch S., Börner J., Smith-Hall C. & Wunder S., 2014. Environmental Income and Rural Livelihoods: A Global- Comparative Analysis. *World Development*, 64: S12–S28. http://dx.doi.org/10.1016/j.worlddev.2014.03.006.
5. Arnold J.E.M., 1994. Non-farm employment in small scale forest-based enterprises: Policy and environmental issues. Working Paper #11.EPAT/MUCIA Research &Training, University of Wisconsin-Madison
6. Arnold J.E.M., 1995. Socio-economic benefits and issues in non-wood forest products use. Report of theInternational Expert Consultation on Non-woodForest Products. Food and Agriculture Organization of theUnited Nations, Rome, Italy.
7. Belcher B.M., 2003. What isn't a NTFP? *International Forestry Review*, 2: 161–168.
8. Belcher B., Ruiz-Perez M. and Achdiawan R., 2003. Global patterns and trends in NTFP development. Paper presented at The International Conference on Rural Livelihoods, Forests and Biodiversity, 19-23 May 2003, Bonn, Germany.
9. Belcher B., Ruiz Pérez M.and Achdiawan R., 2005. 'Global patterns and trends in the use and management of commercial NTFPs: implications for livelihoods and conservation.' *World Dev*., 33(9):1435-1452.
10. CAO, 2012. Forest Peoples: Numbers across the world. Forest People Program.

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11. Collar N.J., Crosby M.J. and Statterfsfield A.J., 1994. .Birds to Watch 2: the World List of threatened birds. BirdLife conservation series no. 4. BirdLife International.
12. CVUC/UCCC, 2014. Communes et villes unies du Cameroun: United councils and cities of Cameroon. Elak Oku. [Online] Available at: http://www.profor.info/profor/activities/livelihoods. [Accessed 16 July 2016]
13. Dodge R., Daly A., Huyton J. & Sanders L., 2012. The challenge of defining wellbeing. *International Journal of Wellbeing*, 2(3) : 222-235. Doi:10.5502/ijw.v2i3.4
14. Enchaw G. B., 2009. An Assessment of Conservation Strategies in the Management of Natural Resources in the Kilum-Ijim Forest Project Area (North of Cameroon), Unpublished Ph.D Thesis, Department of Geography Faculty of Arts, Letters and Social Sciences, University of Yaounde 1, Cameroon.
15. Fishpool L.D.C., 1997. Important Bird Areas in Africa. IBA Criteria: Categories, specieslists and population thresholds. BirdLife International.
16. Fogwe Z.N. &Kwei J., 2015. Cameroonian protected Kilium-Ijim forests for the development of Oku forest fringe community. *Journal of Environmental Research and Management*, 6(5): 0293-0303.
17. FAO, 1991. Non-Wood Forest Products: The Way Ahead. Food and Agriculture Organisation of the United Nations (FAO) Forestry Paper n°97.
18. FAO, 1995. Non Wood Forest Products for RuralIncome and Sustainable Forestry. Rome: FAO (Food and Agriculture Organisation of the United Nations) NWFPs.
19. FAO, 1996. Domestication and Commercialization of Non- timber Forest Products in Agro Forestry Systems FAO (Food and Agriculture Organisation of the United Nations) Rome 9: 32-39.
20. FAO, 1999. An Overview of Non Timber Forest Products in the Mediterranean Region. Rome: FAO (Food and Agriculture Organisation of the United Nations), 1-9.
21. FAO, 2002. Case study of exemplary forest management in Central Africa: community forest management at the kilum-Ijim mountain forest region, Cameroon. By Christian Asanga, October 2002.ForestManagement Working Papers, Working Paper FM/11. Forest Resources Development Service, Forest Resources Division. FAO, Rome (unpublished).
22. FAO, 2008. Socio-economic and livelihoods analysis in investment planning; key principles and methods. Food and Agricultural Organization of United Nations. Rome.
23. FAO, 2014. State of the world's forest.Enhancing the socioeconomic benefits from forests.Food and Agricultural Organization of United Nations. Rome.
24. Forboseh P.F. and Ikfuingei R.N., 2001. Estimating the population densities of Tauracobannermaniin the Kilum-Ijim forests, Northwestern Cameroon. Ostrich Supplement, 15: 114-118.
25. Godoy R., Brokaw N. and Wilkie D., 1995. The Effect of Income on the Extraction of Non-Timber Tropical Forest Products: Model, Hypotheses, and Preliminary Findings from the Sumu Indians of Nicaragua. *Human Ecology*, 23: 29–52.
26. Heubach K., 2011. The economic importance of non-timber forest products (NTFPs) for livelihood maintenance of rural West African communities: A case study from northern Benin, *Ecological Economics* 70(11): 1991-2001.
27. Horning N.R., 2003.The cost of ignoring rules: how Madagascar's biodiversity and rural livelihoods have suffered from institutional shortcomings. Paper presented at the International Conference on Rural Livelihoods Forests and Biodiversity 19-23, Bonn, Germany.
28. Horning N.R., 2004.The limits of rules: when rules promote forest conservation and when they do not – insights from Bara country, Madagascar. Ph.D. Thesis, Cornell University, New York.
29. Ingram V. and Schure J., 2010. Review of Non Timber Forest Products (NTFPs) in Central Africa: CAMEROON. CIFOR, Bogor, Indonesia.
30. INBAR, 2003. GFAR Global Partnership Programme (GPP) on Non-timber Forest Products (NTFPs) for Livelihood Development. INBAR - International Network for Bamboo and Rattan.
31. Jagger P., 2012. Environmental income, rural livelihoods, and income inequality in western Uganda. Forests, Trees and Livelihoods. DOI:10.1080/14728028.2012.698846.
32. Klienn C., Laamanen R. and Malla S., 1996. Integrating the assessment of non-timber forest products into the forest inventory of a large area: experiences from Nepal. In Temo A. et al. (eds.): *Domestication and*

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Commercialization of Non-Timber Forest Products in Agroforestry Systems. Proceedings of an international conference held in Nairobi, Kenya 19-23 February 1996. Rome, FAO: 23-31.

33. Langat D. K., Maranga E. K., Aboud A. A. and Cheboiwo J. K., 2016. Role of Forest Resources to Local Livelihoods: The Case of East Mau Forest Ecosystem, Kenya. *InternationalJournal of Forestry Research* Vol. 2016: 1-10. http://dx.doi.org/10.1155/2016/4537354
34. Marshall E., Newton AC., Schreckenberg K., 2005. Commercialization of Non-Timber Forest Products: First Steps in Analysing the Factors Influencing Success, *Int. Fores. Rev*., 5: 128- 135.
35. Melaku E., Ewnetu Z., Teketay D., 2014. Non-timber forest products and household incomes in Bonga forest area, south western Ethiopia. *Journal of Forestry Research*, 25(1): 215−223. DOI 10.1007/s11676-014-0447-0.
36. Moe K. and Junchang L., 2016. Economic Contribution of Non-timber Forest Products (NTFPs) to Rural Livelihoods in the Tharawady District of Myanmar. *International journal of sciences*, 5(1): 34-42.
37. Monela G.C., Kajembe G.C., Kaoneka A.R.S. and Kowero G., 2000. Household livelihood strategies in the miombo woodlands of Tanzania: emerging trends. Tanzania *Journal of Forestry and Nature Conservation* 73: 17-33.
38. Pattanayak S.K. and Sills E.O., 2001. Do tropical forests provide natural insurance? The microeconomics of non-timber forest product collection in the Brazilian Amazon. *Land Econ*. 77(4):595-612.
39. Aung P. S., Adam Y. O., Pretzsch J., and Peters R., 2015. Distribution of forest income among rural households: A case study from Natma Taung national park, Myanmar. Forests, Trees and Livelihoods 24(3):190-201. DOI: 10.1080/14728028.2014.976597
40. Rijal A., Smith-Hall C., Helles F., 2010. Non-timber forest product dependency in the Central Himalayan foot hills. *Environ. Dev. Sustain*, 13:121–140. DOI10.1007/s10668-010-9252-x
41. Roe D., Nelson F., Sand brook C., 2009. Community management of natural resources in Africa: Impacts, experiences and future directions, Natural Resource Issues, No. 18, International Institute for Environment and Development, London, UK, 207p.
42. Ros-Tonen M.A.F. and Wiersum K.F., 2005. 'The scope of improving rural livelihoods through non-timber forest products. *People, Trees and Livelihoods*, 15(2): 129-148.
43. Saha D. & Sundriyal R.C., 2011. Utilization of non-timber forest products in humid tropics: Implications for management and livelihood. *Forest Policy and Economics* 14 : 28–40.
44. Shackleton C. and Shackleton S., 2004. The importance of non-timber forest products in rural livelihood security and as safety nets: a review of evidence from South Africa. *South African Journal of Science* 100 (11/12): 658-664.
45. Sunderlin W.D., Angleson A., Belcher B., Burgers B., Nasi R., Santos L. and Wunder S., 2005. Livelihoods, Forests, and Conservation in Developing Countries: An Overview. *World Development* 33(9): 1383-1402.
46. Tadesse W., Desalegn G. and Alia R., 2007. Natural gum and resin bearing species of Ethiopia and their potential applications. Instituto Nacional de Investigaciony Technologia y Alimentaria (INIA) 16 (3):211-221.
47. Thomas D.W., 1989. Stranglers and monocarpic herbs in the montane forests of Cameroon.Unpublished report, KIFP.
48. Timko J.A., Waeber P.O. and Kozak R.A., 2010. The Socio-Economic Contribution of Non- Timber Forest Products to Rural Livelihoods in Sub-Saharan Africa: Knowledge Gaps and New Directions. *International Forestry Review* 12 (3): 283-294.
49. Van Dijk H. and Wiersum F., 1999. NTFP resource management as an option for multiple-use forest management in Cameroon. In: VAN DIJK, H., ROSTONEN, M.A.F. (eds.), NTFP Research in the TropenbosProgramme: Results and Perspectives, 114-122

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